



DEPARTMENT OF THE AIR FORCE  
59TH MEDICAL WING (AETC)  
JOINT BASE SAN ANTONIO - LACKLAND TEXAS

18 MAY 2016

MEMORANDUM FOR SGOED

ATTN: MAJ JOSEPH MADDRY

FROM: 59 MDW/SGVU

SUBJECT: Professional Presentation Approval

1. Your paper, entitled **Efficacy of Intravenous Cobinamide Versus Hydroxocobalamin or Control for Treatment of Severe Hydrogen Sulfide Toxicity in a Swine** presented at/published to **Lightning Oral, SAEM Conference, New Orleans, LA 10-13 May 2016** with MDWI 41-108, and has been assigned local file #**16201**.
2. Pertinent biographic information (name of author(s), title, etc.) has been entered into our computer file. Please advise us (by phone or mail) that your presentation was given. At that time, we will need the date (month, day and year) along with the location of your presentation. It is important to update this information so that we can provide quality support for you, your department, and the Medical Center commander. This information is used to document the scholarly activities of our professional staff and students, which is an essential component of Wilford Hall Ambulatory Surgical Center (WHASC) internship and residency programs.
3. Please know that if you are a Graduate Health Sciences Education student and your department has told you they cannot fund your publication, the 59th Clinical Research Division may pay for your basic journal publishing charges (to include costs for tables and black and white photos). We cannot pay for reprints. If you are 59 MDW staff member, we can forward your request for funds to the designated wing POC.
4. Congratulations, and thank you for your efforts and time. Your contributions are vital to the medical mission. We look forward to assisting you in your future publication/presentation efforts.

Linda Steel-Goodwin

LINDA STEEL-GOODWIN, Col, USAF, BSC  
Director, Clinical Investigations & Research Support

## PROCESSING OF PROFESSIONAL MEDICAL RESEARCH/TECHNICAL PUBLICATIONS/PRESENTATIONS

### INSTRUCTIONS

USE ONLY THE MOST CURRENT 59 MDW FORM 3039 LOCATED ON AF E-PUBLISHING

1. The author must complete page two of this form:
  - a. In Section 2, add the funding source for your study [ e.g., 59 MDW CRD Graduate Health Sciences Education (GHSE) (SG5 O&M); SG5 R&D; Tri-Service Nursing Research Program (TSNRP); Defense Medical Research & Development Program (DMRDP); NIH; Congressionally Directed Medical Research Program (CDMRP) ; Grants; etc.]
  - b. In Section 2, there may be funding available for journal costs, if your department is not paying for figures, tables or photographs for your publication. Please state "YES" or "NO" in Section 2 of the form, if you need publication funding support.
2. Print your name, rank/grade, sign and date the form in the author's signature block or use an electronic signature.
3. Attach a copy of the 59 MDW IRB or IACUC approval letter for the research related study. If this is a technical publication/presentation, state the type (e.g. case report, QA/QI study, program evaluation study, informational report/briefing, etc.) in the "Protocol Title" box.
4. Attach a copy of your abstract, paper, poster and other supporting documentation.
5. Save and forward, via email, the processing form and all supporting documentation to your unit commander, program director or immediate supervisor for review/approval.
6. On page 2, have either your unit commander, program director or immediate supervisor:
  - a. Print their name, rank/grade, title; sign and date the form in the approving authority's signature block or use an electronic signature.
7. Submit your completed form and all supporting documentation to the CRD for processing (59crdpubspres@us.af.mil). If you have any questions or concerns, please contact the 59 CRD/ Publications and Presentations Section at 292-7141 for assistance.
8. The 59 CRD/Publications and Presentations Section will route the request form to clinical investigations, 502 ISG/JAC (Ethics Review) and Public Affairs (59 MDW/PA) for review and then forward you a final letter of approval or disapproval.
9. Once your manuscript, poster or presentation has been approved for a one-time public release, you may proceed with your publication or presentation submission activities, as stated on this form. **Note:** For each new release of medical research or technical information as a publication/presentation, a new 59 MDW Form 3039 must be submitted for review and approval.
10. If your manuscript is accepted for scientific publication, please contact the 59 CRD/Publications and Presentations Section at 292-7141. This information is reported to the 59 MDW/CC. All medical research or technical information publications/presentations must be reported to the Defense Technical Information Center (DITC). See 59 MDWI 41-108, *Presentation and Publication of Medical and Technical Papers*, for additional information.

**NOTE:** All abstracts, papers, posters, etc., should contain the following disclaimer statement:

***"The views expressed are those of the [author(s)] [presenter(s)] and do not reflect the official views or policy of the Department of Defense or its Components"***

**NOTE:** All abstracts, papers, posters, etc., should contain the following disclaimer statement for research involving humans:

***"The voluntary, fully informed consent of the subjects used in this research was obtained as required by 32 CFR 219 and DODI 3216.02\_AFI 40-402."***

**NOTE:** All abstracts, papers, posters, etc., should contain the following disclaimer statement for research involving animals, as required by AFMAN 40-401\_IP :

***"The experiments reported herein were conducted according to the principles set forth in the National Institute of Health Publication No. 80-23, Guide for the Care and Use of Laboratory Animals and the Animal Welfare Act of 1966, as amended."***



<b>PROCESSING OF PROFESSIONAL MEDICAL RESEARCH/TECHNICAL PUBLICATIONS/PRESENTATIONS</b>			
1. TO: CLINICAL RESEARCH	2. FROM: (Author's Name, Rank, Grade, Office Symbol) Joseph Maddry / Maj / O-4 / SGOED	3. GME/GHSE STUDENT: <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	4. PROTOCOL NUMBER: FWH20140070A
5. PROTOCOL TITLE: ( <b>NOTE:</b> For each new release of medical research or technical information as a publication/presentation, a new 59 MDW Form 3039 must be submitted for review and approval.) Intravenous versus intramuscular cobinamide compared to intravenous saline (control) in the treatment of acute, survivable, hydrogen sulfide			
6. TITLE OF MATERIAL TO BE PUBLISHED OR PRESENTED: Efficacy of intravenous cobinamide versus hydroxocobalamin or control for treatment of severe hydrogen sulfide toxicity in a swine (Sus Scrofa)			
7. FUNDING RECEIVED FOR THIS STUDY? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO FUNDING SOURCE: 59th CRD O&M Funds			
8. DO YOU NEED FUNDING SUPPORT FOR PUBLICATION PURPOSES: <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO			
9. IS THIS MATERIAL CLASSIFIED? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO			
10. IS THIS MATERIAL SUBJECT TO ANY LEGAL RESTRICTIONS FOR PUBLICATION OR PRESENTATION THROUGH A COLLABORATIVE RESEARCH AND DEVELOPMENT AGREEMENT (CRADA), MATERIAL TRANSFER AGREEMENT (MTA), INTELLECTUAL PROPERTY RIGHTS AGREEMENT ETC.? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <b>NOTE:</b> If the answer is YES then attach a copy of the Agreement to the Publications/Presentations Request Form.			
11. MATERIAL IS FOR: <input checked="" type="checkbox"/> DOMESTIC RELEASE <input type="checkbox"/> FOREIGN RELEASE CHECK APPROPRIATE BOX OR BOXES FOR APPROVAL WITH THIS REQUEST. ATTACH COPY OF MATERIAL TO BE PUBLISHED/PRESENTED.			
<input type="checkbox"/> 11a. PUBLICATION/JOURNAL (List intended publication/journal.)			
<input type="checkbox"/> 11b. PUBLISHED ABSTRACT (List intended journal.)			
<input type="checkbox"/> 11c. POSTER (To be demonstrated at meeting: name of meeting, city, state, and date of meeting.)			
<input type="checkbox"/> 11d. PLATFORM PRESENTATION (At civilian institutions: name of meeting, state, and date of meeting.)			
<input checked="" type="checkbox"/> 11e. OTHER (Describe: name of meeting, city, state, and date of meeting.) Lightning Oral, SAEM Conference, New Orleans, LA, May 10-13, 2016			
12. EXPECTED DATE WHEN YOU WILL NEED THE CRD TO SUBMIT YOUR CLEARED PRESENTATION/PUBLICATION TO DTIC <b>NOTE:</b> All publications/presentations are required to be placed in the Defense Technical Information Center (DTIC).			
DATE September 01, 2016			
13. 59 MDW PRIMARY POINT OF CONTACT (Last Name, First Name, M.I., email) Maddry, Joseph K. joseph.k.maddry.mil@mail.mil			14. DUTY PHONE/PAGER NUMBER 210-630-7374
15. AUTHORSHIP AND CO-AUTHOR(S) List in the order they will appear in the manuscript.			
LAST NAME, FIRST NAME AND M.I.	GRADE/RANK	SQUADRON/GROUP/OFFICE SYMBOL	INSTITUTION (If not 59 MDW)
a. Primary/Corresponding Author Maddry, Joseph K.	Maj	59th EMD/SGOED	
b. Bebarta, Vikhyat S.	Civilian		University of Colorado
c. Garrett, Normalynn	Contractor	59th MDW	
d. Castaneda, Maria G	Contractor	59th MDW	
e. Boudreau, Susan M	Contractor	59th MDW	
f.			
I CERTIFY ANY HUMAN OR ANIMAL RESEARCH RELATED STUDIES WERE APPROVED AND PERFORMED IN STRICT ACCORDANCE WITH 32 CFR 219, AFMAN 40-401_IP, AND 59 MDWI 41-108. I HAVE READ THE FINAL VERSION OF THE ATTACHED MATERIAL AND CERTIFY THAT IT IS AN ACCURATE MANUSCRIPT FOR PUBLICATION AND/OR PRESENTATION.			
16. AUTHOR'S PRINTED NAME, RANK, GRADE Joseph Maddry/ Maj / O-4		17. AUTHOR'S SIGNATURE MADDRY.JOSEPH.K.1179113950 <small>Digitally signed by MADDRY.JOSEPH.K.1179113950 DN: cn=MADDRY.JOSEPH.K.1179113950, o=59th CRD, ou=AFM, email=MADDRY.JOSEPH.K.1179113950, c=US Date: 2016.04.25 13:12:57 -0500</small>	18. DATE April 25, 2016
19. APPROVING AUTHORITY'S PRINTED NAME, RANK, TITLE William C. Terry/GS13		20. APPROVING AUTHORITY'S SIGNATURE TERRY.WILLIAM.CHRIS.11528890 <small>Digitally signed by TERRY.WILLIAM.CHRIS.11528890 DN: cn=TERRY.WILLIAM.CHRIS.11528890, o=59th CRD, ou=AFM, email=TERRY.WILLIAM.CHRIS.11528890, c=US Date: 2016.05.09 13:57:28 -0500</small>	21. DATE

<b>PROCESSING OF PROFESSIONAL MEDICAL RESEARCH/TECHNICAL PUBLICATIONS/PRESENTATIONS</b>			
<b>1st ENDORSEMENT (59 MDW/SGVU Use Only)</b>			
TO: Clinical Research Division 59 MDW/CRD Contact 292-7141 for email instructions.	22. DATE RECEIVED May 11, 2016	23. ASSIGNED PROCESSING REQUEST FILE NUMBER	
24. DATE REVIEWED May 13, 2016		25. DATE FORWARDED TO 502 ISG/JAC May 13, 2016	
26. AUTHOR CONTACTED FOR RECOMMENDED OR NECESSARY CHANGES: <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES If yes, give date. _____ <input type="checkbox"/> N/A			
27. COMMENTS <input checked="" type="checkbox"/> APPROVED <input type="checkbox"/> DISAPPROVED			
28. PRINTED NAME, RANK/GRADE, TITLE OF REVIEWER Linda D Harris, GS 14, Chief, Operations Br	29. REVIEWER SIGNATURE HARRIS LINDA DAWN.113189058 <small>Digitally signed by HARRIS LINDA DAWN.113189058 DN: cn=Linda D. Harris, o=59MDW, ou=CRD, email=LINDA.DAWN@59MDW.AF.mil, c=US Date: 2016.05.13 16:47:27 -0500</small>		30. DATE May 13, 2016
<b>2nd ENDORSEMENT (502 ISG/JAC Use Only)</b>			
31. DATE RECEIVED		32. DATE FORWARDED TO 59 MDW/PA	
33. COMMENTS <input type="checkbox"/> APPROVED (In compliance with security and policy review directives.) <input type="checkbox"/> DISAPPROVED			
34. PRINTED NAME, RANK/GRADE, TITLE OF REVIEWER	35. REVIEWER SIGNATURE		36. DATE
<b>3rd ENDORSEMENT (59 MDW/PA Use Only)</b>			
37. DATE RECEIVED May 16, 2016		38. DATE FORWARDED TO 59 MDW/SGVU May 17, 2016	
39. COMMENTS <input checked="" type="checkbox"/> APPROVED (In compliance with security and policy review directives.) <input type="checkbox"/> DISAPPROVED			
The abstract needs to include the standard disclaimer "The views expressed in this article are those of the author and do not necessarily reflect the official policy or position of the Air Force, the Department of Defense, or the U.S. Government." Once the disclaimer is added, the abstract is cleared for release.			
40. PRINTED NAME, RANK/GRADE, TITLE OF REVIEWER Christopher Carwile, TSgt/E-6, NCOIC, PA	41. REVIEWER SIGNATURE CARWILE CHRISTOPHER STEW ART.1280477229 <small>Digitally signed by CARWILE CHRISTOPHER STEWART.1280477229 DN: cn=Carwile, o=59MDW, ou=CRD, email=CARWILE.CHRISTOPHER@59MDW.AF.mil, c=US Date: 2016.05.17 11:02:08 -0500</small>		42. DATE May 17, 2016
<b>4th ENDORSEMENT (59 MDW/SGVU Use Only)</b>			
43. DATE RECEIVED	44. SENIOR AUTHOR NOTIFIED BY PHONE OF APPROVAL OR DISAPPROVAL <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> COULD NOT BE REACHED <input type="checkbox"/> LEFT MESSAGE		
45. COMMENTS <input type="checkbox"/> APPROVED <input type="checkbox"/> DISAPPROVED			
46. PRINTED NAME, RANK/GRADE, TITLE OF REVIEWER	47. REVIEWER SIGNATURE		48. DATE



**Title:** Efficacy of intravenous cobinamide versus hydroxocobalamin or saline for treatment of severe hydrogen sulfide toxicity in a swine (*Sus Scrofa*) model

**Background:** Hydrogen sulfide (H<sub>2</sub>S) is a potentially deadly gas that naturally occurs in petroleum and natural gas. The Occupational Health and Safety Administration cites H<sub>2</sub>S as a leading cause of workplace gas inhalation deaths. H<sub>2</sub>S is also an attractive terrorism tool because of its high toxicity and ease with which it can be produced. Although unlikely to cause casualties when released in open spaces, in closed spaces, such as aircraft, fatalities could occur. Several potential antidotes are available for hydrogen sulfide poisoning but none have been completely successful.

**Objective:** To compare the time to spontaneous ventilation among groups of swine with acute H<sub>2</sub>S induced apnea treated with intravenous (IV) cobinamide, IV hydroxocobalamin or saline.

**Methods:** Twenty-four swine (45-55 kg) were anesthetized, intubated, and instrumented with continuous femoral and pulmonary artery pressure monitoring. After stabilization, anesthesia was adjusted such that animals would spontaneously ventilate with an FIO<sub>2</sub> of 0.21. Sodium hydrosulfide (NaHS; concentration of 8 mg/ml) was begun at 1 mg/kg/min until apnea was confirmed for 20 seconds by capnography. This rate was sustained for 1.5 minutes post apnea, then decreased to 0.7 mg/kg/min for 3 minutes, then decreased to 0.1 mg/kg per minute for the remainder of the study. One minute post apnea animals were randomly assigned to receive cobinamide (4.2 mg/kg), hydroxocobalamin (4 mg/kg) or saline and monitored for 60 minutes. G\* power analysis using the Z test determined that equal group sizes of 8 animals were needed to achieve a power of 80% in detecting a 50% difference in return to spontaneous ventilations at  $\alpha=0.05$ .

**Results:** There were no significant differences in baseline variables. Moreover, there were no significant differences in the mg/kg dose of NaHS (5.6 mg/kg;  $p=0.45$ ) to produce apnea. Whereas all of the cobinamide treated animals survived, none of the control or hydroxocobalamin treated animals survived. Mean time to spontaneous ventilation in the cobinamide treated animals was 3.2 minutes.

**Conclusions:** Cobinamide successfully rescued the severely NaHS-poisoned swine from apnea in the absence of assisted ventilation.